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Creative and innovative competence as a task for adult education

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Innovation is seen as a key factor in economic competitiveness and persons who can contribute to and participate in innovation are much wanted. Consequently adult education as well as other parts of educational systems is confronted with demands that the learning environments and the teaching should foster creativity, innovativity and entrepreneurship. But what is the nature of such skills, and how can they be developed through education? The knowledge about this is in fact limited, partly because the field is complex but also because it has been dominated by (too) easy conceptualisations and formulas. In this paper I will present and discuss a specific way of approaching this problem. I focus on the concept of creative and innovative competence, the patterns of resources and participation associated with this type of competence and the contributions of work-related general adult education.

The impact of education and learning on innovation

In recent innovation theory a distinction is made between two modes of innovation. One is innovation based on science and technology (STI mode) and another innovation based on experience and user-producer interaction (DUI mode). The STI mode is mainly associated with the widely held model of innovation as a linear process. The distinction between the STI and DUI modes highlights the fact that although the promotion of innovation is often linked to science and technology, development of new products or services is often accomplished without specialized innovation departments, by practitioners with strong knowledge of the specific trade and its markets or users. Innovation policies should include instruments to support not only STI mode, but also DUI mode innovation, preferably in combination.

The types and levels of innovation occurring in a given society reflect the structures, institutions and cultures of that society. Thus it is possible to identify different *national systems of innovation*. Within such a national system different centres of innovation may exist, but firms are probably the most important type. The innovative activity of a firm takes place within an external as well as an internal context. The external context of a firm is constituted by institutions and organizations such as other private firms, universities, government agencies and financial institutions, while the internal context is defined by the firm's institutions and organizational elements that are important for learning and promoting product and process innovation.

Innovation in products and services is often linked organisational change in the innovating units. Some results from the DISKO surveys (a series of surveys of the Danish national innovation system, cf. Lundvall 2002) may serve to illustrate this. Among other results the surveys showed how organisational change gives rise to new demands for qualifications. The table below reveals substantial differences in the pattern of answers between the firms that have introduced new forms

of organisation (percentages outside brackets) and those that have not (percentages in brackets). In firms that have pursued organisational change there are markedly growing demands for independence in the work situation, co-operation with external partners, especially customers, and for co-operation with management and colleagues, while these demands are much weaker in firms that have not changed their organisation. There are correspondingly large differences between the two types of organisation in the rate of occurrence of a reduction in routine work.

Table I: Changes in task content for employees in the period 1993-95 for firms that have made organisational changes (outside the brackets), compared with firms that have not made organisational changes (in brackets).

	More	Less	Unchanged	No answer
a. Independence of work	72,6 (37,1)	4,2 (2,7)	21,2 (56,3)	2,0 (3,8)
b. Professional qualifications	56,4 (36,3)	7,5 (5,3)	33,3 (53,8)	2,8 (4,4)
c. Degree of specialisation	33,9 (26,2)	20,8 (7,8)	39,3 (58,4)	6,0 (7,5)
d. Routine character of tasks	5,6 (8,2)	41,8 (15,5)	45,0 (67,1)	7,7 (9,1)
e. Customer contact	51,6 (29,3)	5,1 (3,1)	37,2 (59,9)	6,1 (7,6)
f. Contact with suppliers	34,9 (18,0)	7,1 (4,3)	46,4 (62,0)	11,6 (15,6)
g. Contact with other firms	24,7 (14,0)	5,5 (4,3)	56,8 (68,9)	13,0 (13,7)
h. Co-operation with colleagues	59,1 (27,1)	5,8 (4,5)	31,8 (63,3)	3,2 (5,0)
i. Co-operation with management	64,9 (28,6)	5,9 (4,2)	26,1 (62,2)	3,1 (4,9)

Source: Voxted 1999, DISKO-Survey, N=952 (981)

All firms, especially those that engage in organisational change, require not only employees with high levels of specialized knowledge but also employees can communicate and collaborate internally and externally. Firms oriented towards change are at the same time asking for both more and less specialisation. If educational programmes and institutions are to respond to this, more efforts should be made to prepare students for communicating and co-operation across the specialized knowledge areas.

In work following up on the DISKO surveys Nielsen (2006) has further elaborated relationships between innovation, education and organisational learning in the Danish context. He identified firms that had been active in product development either on the national or the international level. He then compared patterns of job turnover, employee educational levels and the use of learning organisation procedure for innovative and non-innovative firms. Some important findings were the following:

- The most innovative firms had the lowest job turnover. There was a positive relationship between innovation and personnel policies of keeping knowledge resource and learning competences
- Firms with learning organization features, such as cross occupational work groups and planned job rotation had much higher chance of being involved in product innovation
- Firms with learning organization features hired the largest proportion of higher educated persons
- Firms where a large share of the employees had vocational training also gave high priority to competence development. There was thus a positive relation between these vocational education and engagement in types of in on-the-job training.
- The flows of unskilled employees in and out of the organisation was lowest in the firms with high extensity of training, where unskilled were often included in the training activities

Nielsen emphasizes that although company engagement in learning organization practises often benefit employees with vocational and higher education, unskilled employees may also benefit to some degree.

'The structure of organizational dimensions and an active learning culture are necessary conditions, which bridge the system of innovation and the system of employment in the learning context. This means that demand for labour gradually may be turned towards higher educated, who are trained in analytical skills and used to learn and accumulate knowledge continuously. The knowledge and competences of the skilled and unskilled employees are complementary and important as well, and the firm may choose to develop a learning culture on this foundation. In this way the tacit knowledge is preserved and the core competences are developed continuously by internal means' (Nielsen 2006, p. 8).

In sum there seems to be strong links between firm competitiveness, product innovation, recruitment of employees with higher education, learning organisation procedures and low job turnover.

Conceptualising creative and innovative competence

This raises the question of how innovative skills may be characterised and identified at the individual level. One attempt to do this was the Danish national 'competence audit'. In the years 2001-2005 the several Danish ministries undertook to map the competences of the population. Drawing on work initiated in the OECD (the DeSeCo project, cf. Rychen, & Salganik 2001) the Danish project conceptualised ten key competences (Danish Ministry of Education 2005a) and commissioned a major survey on the distribution of these in a representative sample of Danish citizens (Danish Ministry of Education 2005b). In the Danish study one key competence was added to the OECD list. This was 'creative and innovative competence'.

Creativity has often been conceived as an individual characteristic. In the research literature different characteristics of creative persons are indicated, like the ability to formulate new problems, the ability to transfer knowledge across contexts and the ability to focus attention strongly on specific goals. However, more recent research emphasizes that creativity is not located solely in the individual, no matter how brilliant or extraordinary the person may be. Creativity is rather seen as an interaction, a dynamic relationship involving the individual (with his or her specific capacities, needs and dispositions), the domain of knowledge and skills within which the person works and the social field (with institutionalized norms, criteria and rewards) associated with this domain (Gardner 1994, Csikszentmihalyi 1997). Creativity is only realized when a person does new work in a domain and the field values this novelty.

In contrast to creativity the concept of innovation originates in the development of technologies and products in companies and other organizations. The conceptual framework for analyzing innovation is most often taken from economics or business studies, and innovation is viewed as an organizational activity rather than an individual quality.

The concepts of creativity and innovation both indicate something new is brought about; products, plans, knowledge that clearly distinguishes itself from what already exists. This novelty may take different shapes. It can be a new kind of product that opens up new markets. It can be a new theory that reorganizes existing knowledge within a certain domain. It can be a political strategy that has

the ability to guide collective action and at the same time signal crucial values. And it can be a work of art that distinguishes itself in a certain genre through its optimal use and combination of existing ideas or techniques.

On this background creative and innovative competence can be defined in the following way (Rasmussen 2002, p x):

Creative and innovative competence is the capacity of a person, given the resources and the situation allows it, to effect visible innovation in a domain of knowledge and practise. The competence included three components:

1. *transfer and combination skills;*
2. *balanced autonomy*
3. *focusing ability and discipline.*

Some brief on the three components. An example of the first one is the concept of 'bisociation', which is Koestler (1964) uses to characterize the basic structure of the creative moment. The bisociation established an association between two contexts that are normally perceived as separate. This causes a sudden shift in the flow of consciousness from one frame to another. This structure, which creativity shares with humor, is a type of transfer.

Balanced autonomy means that the creative or innovative person should not be too eager to please or to accept influence from his or her surroundings. Selzer & Bentley (20xx) emphasize that the creative person formulates problems instead of letting others define the problems. Autonomy and confidence are necessary, also to endure the risks often involved in testing out new and controversial practices. However, autonomy most be balanced by knowledge about and experience in the domains and fields of the innovative activity.

There is much evidence for the fact that successful creative activity demands a high degree of *discipline*. The creative individuals studied by Gardner (1994) often dedicated themselves to their work and ideas in ways that could border on the ruthless. Such single-mindedness is probably neither necessary nor widespread: but still the ability to focus sustained effort appears crucial to creative and innovative competence.

It is convenient to distinguish between an individual level, where the human competencies can be described, and an organizational level, where settings fostering creative and innovative competencies can be described.

At the individual level some key characteristics of creative and innovative competence are capability to transfer and combine knowledge, social and mental autonomy, the ability to focus efforts and a thorough understanding of the knowledge domain in question.

At the organizational level some key qualities of innovation-rich settings are trust and support, freedom to exercise self-control, variety in learning contexts, a balance between challenges and capabilities and ample access to feedback.

The distribution of creative and innovative competence

In the competence audit survey it was attempted to map the distribution of creative and innovative competence in the Danish population and especially among employees in Danish workplaces. The competence was operationalised in a series of questions about the respondents' activities, their perception of contexts for creativity and their knowledge about how to develop new ideas. It is of course extremely difficult to measure this kind of phenomena with survey methods, and some of the questions asked clearly did not work. Still, the survey did produce relevant knowledge, and I shall try to summarise some key results (cf. Danish Ministry of Education 2005b, pp 86-101[1]).

Looking at *participation in innovative activity*, the level of education emerges as an important factor. In the survey 69 pct. of the persons with no more than basic school education indicated that they had not been involved in product innovation at all, while the corresponding figure for persons with higher education was no more than 33 pct. This does not, however, mean that higher education in itself provides creative and innovative competence.

The survey results in the related area of learning competence indicated that *age* may be a handicap in that area of competence. But in the area of creative and innovative competence older employees do not seem to lag behind. Among persons of 60 years or more 16 pct. were among the most active in innovation, which is not much less than the average of 21 pct. Also a considerable share of the older employees answered that their ability to develop new ideas was a reason for holding their present job. Young people between 20 and 25 seem to be the age group making least contribution to innovative activity. In this group only 11 pct. answered that they contributed to innovation of products or services, while 60 pct. answered that they did not contribute at all. This probably reflects the fact that participation in innovative activity presupposes a level of practical experience and a recognized position in the firm, both of which are only established after some years of working.

Another aspect of creative and innovative work activity is participation in the *development and the testing of new ways and methods of working*. Here again the survey showed a positive correlation between innovation and level of education. One third of the persons with a higher education indicated that they had participated in developing new methods to a high or a very high degree, while only 18 pct. of persons with no more than basic education indicated this. Still it seems that far from all highly educated employees are active in innovation. One third of employees with higher education answered that they had not participated in developing new products or services.

In the area of testing new work methods the survey showed clear differences between occupational positions. Looking at persons who had not at all participated in testing new work methods, a higher share was found among skilled and unskilled employees than among salaried employees.

A further aspect is the *interaction of work and leisure activity*. The respondents were asked whether they in their spare time think about ideas to be used in work. Among self-employed persons 65 pct. answered that they did this to a high or very high degree. It is in fact well known that work and leisure often tend to melt into each other in the life style of self-employed persons. It is worth noticing, however, that this tendency is almost as strong among managing officials. The survey participants were also asked in what *area of everyday life* they mostly put their creative abilities to use. Clear differences were found between occupational groups and between levels of education. Self-employed persons and managing officials primarily used their creative ability in work, while

[1] In the report the results are mainly presented through diagrams. Some of the exact percentage figures quoted below are not to be found in the report, but in background material.

unskilled employees primarily used it outside work. And highly educated people with long weekly working hours used their creative ability very much in work settings. Interestingly this was one of the few aspects of creative and innovative activity with a clear gender difference; men used their creativity in the workplace to a higher degree than women.

As number of questions were asked about the *context for creativity and innovation* in work organisations. One aspect here was the degree to which workplaces demand innovative thinking from their employees. Here again the employee level of education is an important factor. High demands on innovative thinking seem to be directed mainly at persons with higher education and persons employed as managing officials (two groups that overlap much). About half the persons with a higher education indicated that innovative thinking was expected from them to a high or a very high degree, and only 7 pct. of the managing officials thought that innovative thinking was not needed in their work at all.

Another aspect of the context for creativity was how much support for innovative thinking employees got from their immediate superior. In fact more than half got such support; about 15 pct. of respondents indicated that they were supported to a very high degree, about 40 pct. to a high degree. Only 5 pct. felt they got no support at all for innovative thinking. Even without available data for cross-national comparison it seems that the creative and innovative activities of Danish employees get fair support from management.

An important aspect targeted in the survey was the degree to which persons had acquired creative and innovative competence through *education and continuing education*. As could be expected the level of education again emerged as an important factor. A much higher share of the highly educated indicated that they had learned to develop new ideas through education or through continuing education. There is little doubt that longer study programmes will in fact give more room for developing creative abilities than short programmes, but it should not be overlooked that persons with a higher education will also be more aware of the value of education and thus tend to respond more positively in surveys.

The most important finding about the role of education for innovation is that a very small proportion, in average no more than 8 pct. of the respondents regarded education a very important source for creative and innovative competence. One possible interpretation of this is that a person's original education-based skills gradually come to play a lesser role as the person acquires work experience and develops his or her competence in the job. It would then be logical to expect that employees with for instance ten or more years of work experience would rather link improvements in their innovative abilities with continuing education or in-service training. However, this does not seem to be the case. Very few of the survey respondents with long work experience indicated that continuing education had had a significant impact on their ability to engage in innovative thinking. In fact a major part of the persons in the survey, irrespective of various background factors, did not at all connect their participation in continuing education with creativity and innovation.

To sum up some main results from the survey of creative and innovative competence were:

- In general the highly educated are more creative and innovative than persons with lower levels of education
- The highly educated employees with long working hours and management responsibility appear to be Denmark's most creative and innovative group

- Most Danes think that they work in innovative workplaces, but their own jobs do not to the same extent demand innovative thinking. This applies especially to unskilled workers
- Skills and tools for innovations are only to a very limited degree acquired through education and in-service training

These results could indicate that many of the companies that are perceived as (and perceive themselves as) innovative face a major challenge in not only mobilising the creative abilities of the highly educated, but integrating creativity and innovation as a natural part of work at all levels and for all groups of employees. And there seems to be a pressing need for types of continuing education and in-service training that can develop and strengthen the creative and innovative competences of employees. Developing such types of education is no easy task; there are many open questions as regards delivery, educational principles, learning spaces and teaching staff. But is should be possible to improve significantly on the situation shown by the competence survey.

Innovative learning in adult education

So what kind of principles and practises should be pursued in educational institutions and programmes if students in all age groups are to acquire and maintain a higher level of creative and innovative competence? At a general level many authors do in fact agree about the types of educational environment, teaching and learning required. Here is an example:

'The term 'creativity' is used here to refer to teaching and learning processes based on recognizing problems and discrepancies in accepted content, looking at things in a different way, making unexpected links among apparently discrepant elements of information, developing your own solutions to problems and similar processes, rather than simply memorising prescribed content and accurately regurgitating it upon demand or mastering and constantly reapplying standard methods. Teachers interested in the first kind of approach place a high value on novelty, ingenuity, boldness and the like, not just on speed, formal correctness or accuracy (Cropley & Cropley 2008, p. 355).

Another example is a set of principles for a curriculum based on the need for creative application of knowledge formulated in a report from the *Demos* think tank (Selzer & Bentley 1999, pp. 81-82).

- Learning would be structured mainly through projects. Some projects would be individual, while many would be group-based.
- Students would repeatedly practice identifying and solving problems.
- Learning would take place in a range of contexts and use a range of methods.
- Knowledge and learning gains would be assessed from different perspectives – including that of the learner.
- Thinking and self-assessment would be embedded across the curriculum.
- Skills would be revisited and practiced over time, so that knowledge gained earlier in an educational career could be applied creatively to new problems.
- Students would gain depth of understanding in a number of disciplines**,** or domains of knowledge, including traditional academic subjects.

How such principles can be practised in adult education depends the specific setting and the many factors involved in it: The framework for and the content of the educational programme, the background and situation of participants, social and cultural context, the economic conditions and many other things. In the following section I shall describe an empirical case, where innovative practices were introduced in one part of the Danish adult education system.

A cooperation and communication course in a metal works factory

In the development project from which this case is drawn[2], centres for general adult education established work related courses in cooperation with private and public enterprises. The participants of the courses were employees, mainly low skilled. Before the courses actually started the conditions and curriculum were negotiated and jointly decided by the company and the education centre. Certain guidelines within legislation on general adult education had to be followed, but the law is fairly open to tinting the courses and subjects in the direction of the company wishes.

The metal works factory employed some 70 production workers, the majority between 40 and 60 years old. About two thirds were unskilled. It was a male-dominated workplace, and the few women in production did assembly work. The company had started to outsource parts of the production to a new factory in the Ukraine. In the future the Danish part of the company was to expand its flexibility in delivering smaller series. The employees described their work as varied and sufficiently challenging. Periods up to a deadline could be very stressful.

The course program was planned when management learns that the teacher had successfully completed a course in Cooperation and Communication at another local metal works factory. The teacher prepared the course after three focus group interviews with the three levels in the company: management, foremen and employees. Based on the interviews, she adapted the content of the course to the company's current needs.

The course was primarily tailored to the production workers, but there was also a special course for the administrative staff and foremen. It proved positive for the employees' attitude that the course is mandatory for everybody and that also the foremen participate.

The employees were divided into 8 groups of 8 to 9 persons across job functions at the factory. The course ran for 40 hours over 2 + 3 days. There was a break of about 8 weeks between the first two and the final three course days. The course took place at the local VUC.

A key element in the instruction was that it constantly related theory and the participants' everyday lives broadly through examples and dialogue. Dialogue and confrontation provoked the participants to voice their opinions, which the teacher then discussed with them. This process challenged and perhaps shaped the participants' attitudes. The teacher maintained a high energy level in the groups and made the instruction entertaining. The teacher's primary goal was to develop the participants as persons, and not primarily towards a certain work identity.

The course was evaluated in the presence of the company's director and foremen. The evaluation consisted of three parts: 1) theoretic reflections on a constructed case; 2) exposing outcomes for the participants; 3) presentation of three goals for the company formulated independently by the participants and discussed as part of the course. There was test. The course was followed up by

[2] The project lasted 2½ years and included courses in three regions of Western Denmark. The Project covered 66 courses with varying numbers of participants (from 7 to 150). Many courses were short (40-60 hours). The most frequently taught subjects were Danish at basic preparatory level and IT and Cooperation and Communication at general level (Hviid et al 2008). The case study of the metals works factory was done by Hanne Dauer Keller and is documented more fully in a research report (Keller 2005).

classes at the company oriented towards the goals formulated by the participants (e.g. more information, more education and better environment).

A unique feature in this type of company-adapted course in Cooperation and Communication is that the teacher takes on a special consultant role with emphasis on facilitating the company's change processes. The teacher transcends the traditional boundaries between educational institution and work life by 1) examining the participants' needs (here via interviews); 2) incorporating issues from the company in the course; and 3) offering consulting services after the course in connection with a follow-up.

Outcomes

The study made of this course showed that employees especially benefited from the transaction analysis approach to communication, which was taught in the course. It resulted in increased focus on 'talking things through', which could potentially help decrease the level of conflict among employees and between management and employees. The employees realized that in order to exploit this potential it was important to work on communication and cooperation. But this is not always easy to achieve. One informant pointed out that production demands take priority and then the employees do not have the time required to practice good communication.

It was also evident that some participants arrived at personal insights. The teacher observed (in an interview) that the participants had achieved greater self-awareness, and she thought this would express itself in the personalities and have an effect in cooperation.

An important outcome of such a course is that the participants learn about their workplace from other perspectives, both in the formal learning space and during breaks. Via these perspectives and via course material that concerns the workplace, the participants increase their knowledge of the company, work assignments and personnel issues across the organization. In unskilled work and a strict division of labor employees often have knowledge only about the specific part of the organization and the tasks for which they are responsible. Talking with colleagues in other functions gives them a different perspective on their own department's practice or a greater overview of the workplace as a whole.

Not only the employees learned something by attending courses; management could also benefit in special ways. In one case, the management was present at the closing of a course and witnessed the participants' presentations. One informant (a manager) said that he got a new impression of the employees' resources by watching the presentations, which turned out to be much more thorough than he had expected.

This case, and the development project in which it was part, show that general adult education can successfully be related to the work life. In this way the courses can be made more relevant and more accessible to adults who need competence development, but who do not actively seek out education at adult education centre. With the tailoring of courses to workplaces and the introduction of subjects like "Cooperation and communication" some vocational aspects are introduced and merged with the academic curriculum of general education. The logic of work is mixed with the logic of education, and a practise-based curriculum is partly introduced.

Such transgressions of existing boundaries are at the core of creative and innovative competence, as described in the preceding section. In the definition of creative and innovative competence 'transfer and combination skills' are also regarded as one of the key components. The investigation of the empirical case did not include a later assessment of the competence acquired by the participating employees, so we have now way of knowing if a growth in creative and innovative competence did in fact take place. But the case still illustrates the kind of adult education practises that point towards this goal.

Conclusion

The argument in this paper has been developed around the concept of creative and innovative competence. As stated I understand this competence as the capacity of individuals to effect visible innovation in a domain of knowledge and practise, and I identify three main components in it: (1) transfer and combination skills, (2) balanced autonomy (3) focusing ability and discipline. Results from the Danish competence audit, which have discussed in the paper, indicate clear social inequalities in the distribution of creative and innovative competence. The highly educated employees with long working hours and management responsibility appear to be distinctly more creative and innovative that other part of the population; they appear like a 'creative class', but are a narrower segment than in Florida's analysis (Florida 2002).

Research discussed in the first part of the paper indicates strong links between firm competitiveness, product innovation, recruitment of employees with higher education, learning organisation procedures and low job turnover. New products or services on the market can be seen as materialisations of the firm's collective and dynamic ability to learn and generate knowledge. The distinction between the STI and DUI modes of innovation highlights the fact that although the promotion of innovation is often linked to science and technology, development of new products or services is often accomplished without specialized innovation departments, by employees with strong knowledge of the specific trade and its markets or users. Educational initiatives to promote creativity and innovation should support not only STI mode, but also DUI mode innovation, preferably in combination.

The usefulness of the concept of competence in this context can of course be questioned. It can be misleading in some respects. For instance it can convey the image of competence as a parcel, in which all the knowledge and skills of a person are neatly packed for the person to bring to a given work context, where they can then be unpacked and put to use. Such an image clearly misses the flexible and unfinished character of competence and the interrelationship between development and use of competence in different contexts. This is especially problematic in the case of adult education which often takes place in close contact with work and other areas of everyday life. Nevertheless we need to have categories to describe the outcomes of learning processes, and I find the concept of competence more relevant than more traditional concepts of education and learning research, like skill, knowledge and curriculum.

Even though the highly educated seem to be more creative and innovative than persons with lower levels of education, they do not think that this competence has been acquired through education in-service training or in-service training. This indicates that there is much room for improvement through reform of learning environments, educational principles and curricula. Principles like organising learning through projects, identifying and solving problems, including a range of contexts and a range of methods, practising reflection and self-assessment, promoting

understanding in several domains of knowledge and including a great deal of group-based work are useful guidelines for this, but the specific conditions and resources of different national and institutional contexts should be taken into account.

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